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THE ABCs OF PRINTING

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TAMING THE DASD MONSTER TAXING TIMES FOR LEASING
DESKTOP PUBLISHING: A NEW CHAPTER

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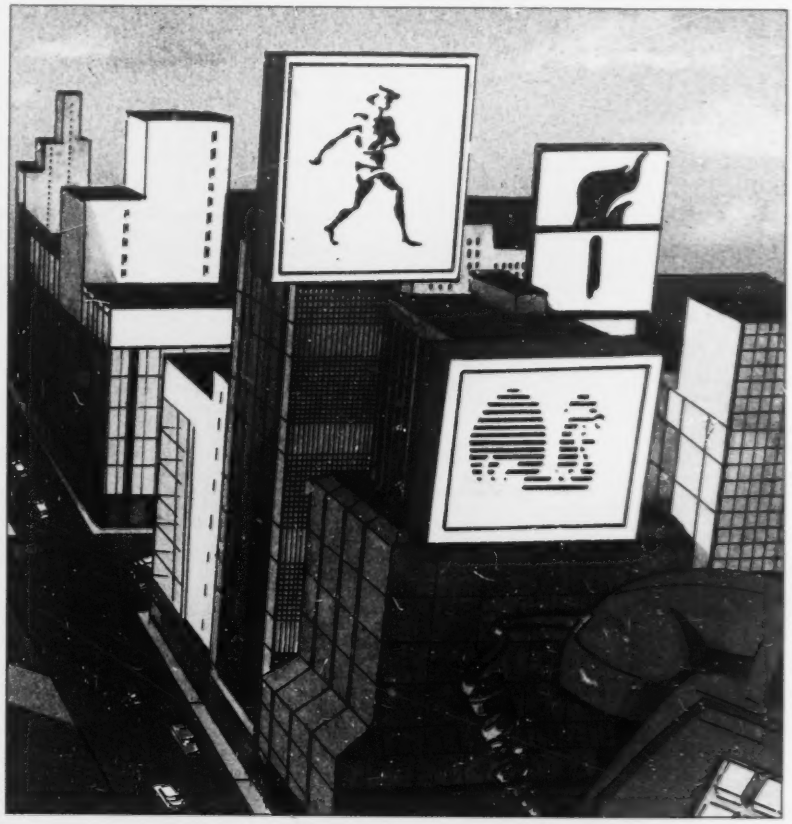

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THE ABCS OF PRINTERS

by Hesh Wiener

On May 3, 1983, IBM introduced its 2,000 lpm model 4245 line printer. The product suffered from some engineering problems — problems that came as a surprise since IBM's line printers have almost always been the best in the industry. For two years, IBM tried to mollify unhappy users who complained about the device's print quality and stability, but the reputation of the $54,500 box was tarnished beyond repair.

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was out, it had become one of IBM's most successful line printers.

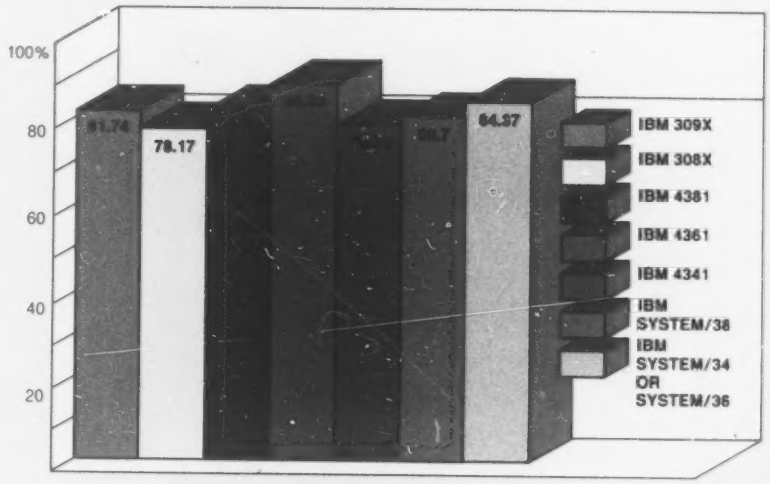
This success, however, did not spell relief for disgruntled owners of the original 4245s. In fact, it exacerbated their woes. Customers who purchased the first version of the printer are married to the machine. The printer simply cannot be resold. Nobody will buy it at any price. Even leasing companies that invested in the machines have philosophically, if not financially, written them off. Investors in lease-based tax shelters are in the same position as lessors, but because they buy into large and diverse pools of equipment, they are unlikely to feel the pinch.

IBM never offered buyers of the older 4245s a chance to trade in their machines for newer and better units. The company's position seems to be that the original machines, even with their faults, performed as promised and, with IBM maintenance, will continue to work for years to come. Indeed, many buyers of the old 4245 appear to be happy.

So are third-party firms that sell used IBM gear as an alternative to the manufacturer's new products. IBM's flub produced a windfall for its third-party competitors. From the time the first 4245 was introduced until the revised version was shipped in volume, the third parties that had portfolios of used IBM printers cleaned up. Such stalwarts as the 1,200 lpm 3203-5 and the 2,000 lpm 3211/3811 printers gained value as buyers bid up the prices. Even the venerable 1403-N1, which dealers had pretty much consigned to the scrap heap, garnered a few orders.

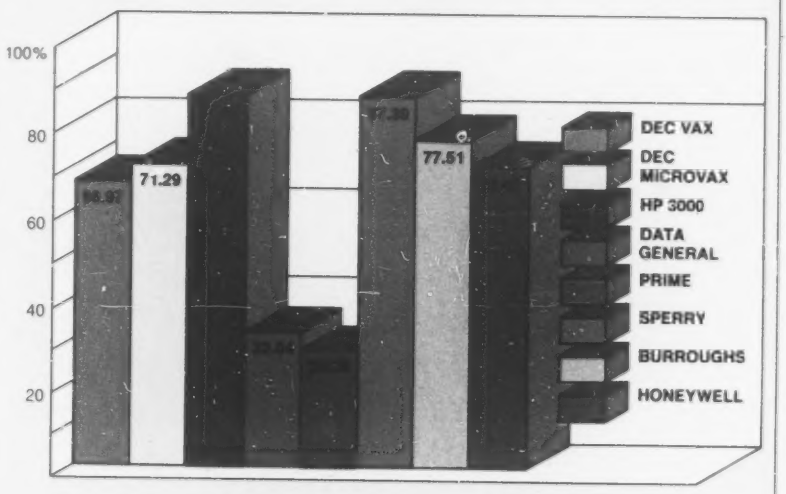
IBM also did well with another new printer, the model 4248 that runs at up to 3,600 lpm. This heavy-duty machine became more attractive to midrange users who might not have been willing to plunk down $99,000 for a line printer under less pressing circumstances. (When the revised 4245 was introduced, the price of the 4248 was cut to $75,000 to maintain sales momentum.) In addition, non-IBM printers from various makers became a bit easier to sell to formerly true blue shops.

FIG. 1
IBM'S SHARE OF PRINTER BASE



SOURCE: COMPUTER INTELLIGENCE SURVEYS OF U.S. INSTALLED BASE

FIG. 2
VENDORS' SHARES OF PRINTER BASES



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A HIGHLY UNUSUAL IBM CASE

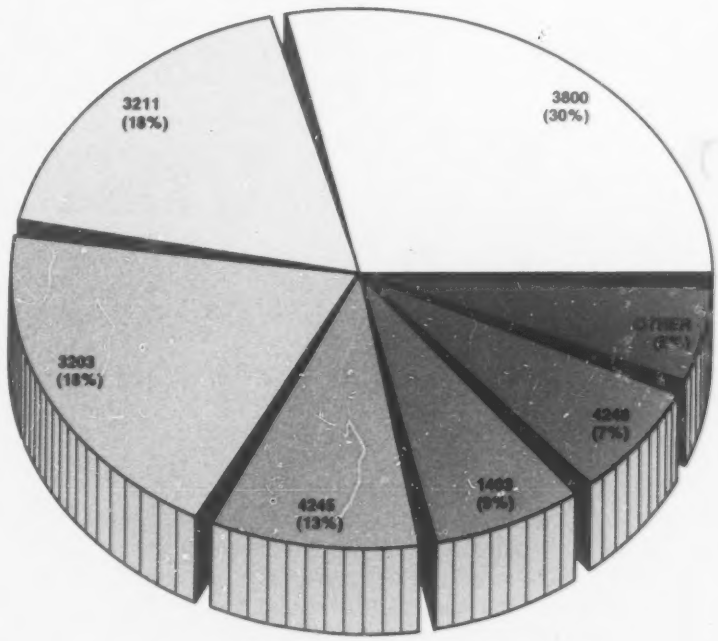
The case of the 4245 was highly unusual for IBM and for the computer industry as a whole. Processor vendors normally enjoy extraordinary success in selling their printers to users, and so, indirectly, do several independent manufacturers that provide printers on an oem basis to the full-line computer vendors. But the story of the original 4245 and what happened when users realized it was not up to snuff demonstrates that even IBM, the strongest vendor of them all, must yield to the will of the market.

The will of the market in the printer sector seems to be operating in favor of the processor vendors. Surveys of the U.S. installed base conducted by Computer Intelligence Corp. of La Jolla, Calif., show that mainframe and minicomputer companies provide the overwhelming majority of the printers installed by their customers. IBM printers are attached to IBM mainframes, Digital Equipment Corp. printers to DEC machines, and so on (see Figs. 1 and 2). The notable exceptions are mini makers Prime Computer and Data General, which have simply not pushed their own printer products the way other computer makers have.

Roughly 10% to 20% of the market veers away from the processor path and goes its own way. That more random route

FIG. 3

IBM PRINTERS ON 3090 SYSTEMS



SOURCE: COMPUTER INTELLIGENCE SURVEYS OF U.S. INSTALLED BASE

represents a substantial opportunity for independent printer makers. It's good for maverick users, too. They don't have to feel they're the only ones out there shopping for their own output devices.

In the personal computer world, things are a little different. Machines built to the IBM standard can drive dozens and dozens of printers. All the successful software packages for the IBM PC family and its vast horde of imitators are designed to drive a variety of output devices. The diversity in this market stems from IBM's decision to go with a standard plug on the back of its original PC, leaving the rest of the interface job up to printer makers and software houses.

Also, IBM did not offer its own printers to PC users at first. Instead, it put its logo on dot matrix machines made by Epson and let users know it. As a result, corporate America grew to trust Epson's printers, and, by inference, those of other Japanese companies. So even though IBM now has two strong contenders of its own in the Proprinter and Proprinter XL, there is little evidence that users can easily be wooed back into the IBM fold in the short run. In the long term, of course, the printer game may go to a persistent IBM.

In the other personal computer ballpark, where Apple goes to bat, the Macintosh requires a printer that can replicate bit-mapped screen images. This has greatly limited most of the company's users to Apple-supplied printers. The Mac, however, does use an independently developed page description language that permits intrepid users to attach various laser printers and typesetters to the machine.

A mainframe's age seems to be a factor in the user's choice of printer. This is evident in Computer Intelligence's extensive studies of the IBM base. While nearly 82% of the printers on 3090s come from IBM, only 78% of the printers on 3080s are supplied by the computer giant. And, while more than 88% of the printers on 4381s are from IBM, only 79% of the printers on 4341s bear Big Blue's logo. The 3090, of course, is the successor to the 3080, just as the 4381 is the follow-on to the 4341. Figs. 3 and 4 show how Big Blue's printer pie is divvied up on the 3090 and the 4381.

Many of the older mainframes are no longer in their original homes. When a user organization decides to install a second-hand computer—and buck the pressure to buy new gear directly from the manufacturer—it apparently is also more open-minded when it comes to buying printers. Used computers almost invariably pass through the hands of dealers. These dealers generally prefer to install all-IBM systems, so the statistics showing that non-IBM printers are more abundant on older machines reflect user preferences, not characteristics of the used equipment market.

STRONG SUPPLIER A FACTOR

Another factor that influenced the preferences of users of old IBM systems was the presence of a strong pcm supplier, Storage Technology Corp. While STC was growing into a billion-dollar business by supplying plug-compatible tape and disk systems, its printer subsidiary, Documation, was achieving substantial penetration into the IBM market. Things have changed dramatically since then, however.

Users, worried over STC's Chapter 11 bankruptcy filing, have been justifiably skittish, though the company's service and support received a great deal of attention from ceo Ryal Poppa. Should a new Storage Technology emerge from court protection with vigor—and the right products—the base of non-IBM printers on new IBM systems will almost certainly increase in size.

Outside the IBM arena, conditions are similar. The other mainframe makers have done roughly as well as IBM, selling most printers to their own user base. Ironically, Honeywell, the only mainframer that's succeeded in selling very high speed, nonimpact printers to IBM mainframe shops, seems to do worse than others in peddling printers of all types to its own customers. But the Honeywell survey data may be influenced by the company's minicomputer base. In the minicomputer business, users tend to be more independent of processor vendors than in the mainframe realm.

Users of DEC VAX machines are a good example of this independent streak among mini customers. Even though DEC printers enjoy good reputations, VAX users still buy a third of their machines from other suppliers. This can be partly attributed to the important role value-added resellers (vars) play in the DEC VAX market. Vars that provide independently made printers can often give users more value for their money. The vars, meanwhile, increase their profit margins through such sales.

The VAX market is also a much better target for independent printer makers than any other. Digital's VAX base includes more machines than that of the comparably powered IBM 4300 series. That base is also growing more rapidly than the 4300 base. Add to all this the availability of printer interface cards at modest prices, and you get a marketplace that simply boils with competition.

While all this may put the heat on marketing executives charged with selling DEC printers, the peripherals race helps the company sell processors and other system

components to budget conscious users. These days, that means just about everyone, as DEC's financial results so clearly show. Also, there are indications that the mini manufacturer's increasingly competitive home-brewed printers are winning market share among users who are putting in new VAX machines. The statistics on the MicroVAX base, which includes a larger proportion of recent installations, show that Digital has done a better job of selling printers during the last year or two.

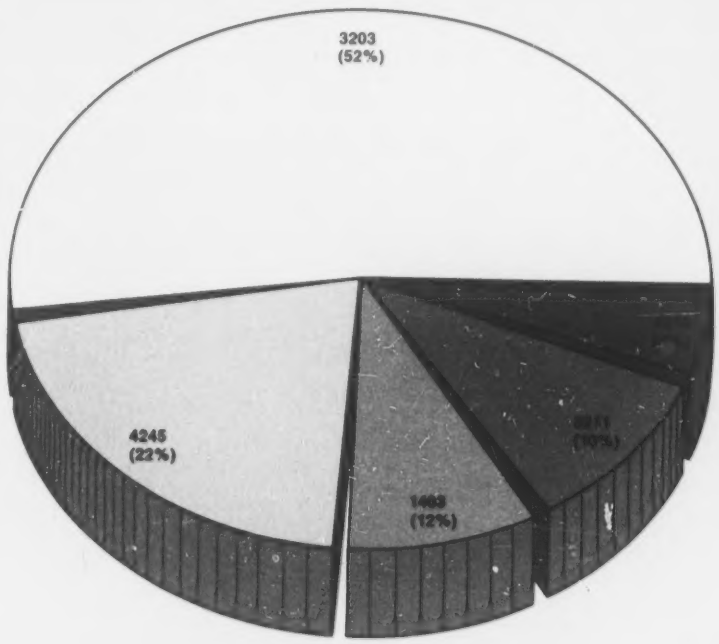
Other minicomputer makers have had mixed success in the printer business. One firm that comes out on the successful side is Hewlett-Packard. The California company, which has put tremendous emphasis on its peripheral wares, has earned strong user loyalty. HP has been providing excellent nonimpact printers for years, and its reputation for good service on all peripherals makes it a force in the field to be reckoned with. The result is apparent in the statistics and in the way the company has succeeded in selling printers to users of rival minicomputers.

It is not only the desktop laser printer market that Hewlett-Packard has taken by storm. The company's midrange laser printers are also in demand. These printers are the basis of the hardcopy output on MCI Mail's VAX network and they show up in many shops that have processors made by HP and its competitors.

Hewlett-Packard isn't the only player in the nonimpact printer business. At the high end, IBM's 3800s are the most widely used machines. Xerox also has a strong entry in the nonimpact niche, as does Honeywell. Kodak too is about to make the plunge into the midrange market, which has become a battleground for makers of high-end machines seeking to expand their business and producers of low-end printers that are looking for growth opportunities. The technologies used by various vendors include laser, LED array, and electrostatic transfer. It looks as if several techniques for inking paper will remain around for some time. So, of course, will paper, a persistent printer problem.

A nonimpact printer suffers from the same trouble copiers do. Paper is a dusty and generally annoying material to move through a complex machine. It also can be stubborn when it comes to taking toner. End users who want a choice in the type of paper they use for billing, management reports, and other kinds of computer-generated hardcopy are unsympathetic to the engineer's dilemma. Every improvement in image quality that an engineer makes is met by a paper mill's development of some new, cheap, attractive, and inhospitable batch of squashed wood pulp.

FIG. 4
IBM LINE PRINTERS ON 4381 SYSTEMS



SOURCE: COMPUTER INTELLIGENCE SURVEYS OF U.S. INSTALLED BASE

Nonimpact printers reduce the cost of preprinted forms. As color capability is added to the machines—something likely to happen in the midrange before it does at the high end—even more forms will disappear. Nor has the large dp shop overlooked the way laser printers and their kin have changed desktop computing. By permitting users to control typography, graphics, and other aspects of document production, laser printers have greatly increased the effectiveness of computer printed materials.

Midrange laser printers, which have benefited from progress in page description languages, provide good graphics quality. For users of nonimpact printers, the job of moving images from a workstation screen to paper has been greatly simplified.

What's coming in that era may not be coming from number one. Oddly enough, IBM has thus far been a laggard in the nonimpact printer domain. Most nonimpact printers generate images at 300 dots per inch, but IBM's entries have a significantly lower resolution, 240 dots per inch. While several vendors have been able to link workstations to hosts and printers in a way that permits images to remain intact as they travel down the cables, IBM, with its diverse installed base and incomplete networking strategy, is unable to deliver end-to-end compatibility. While it's true that IBM's problem is far larger than that of other vendors, so is IBM's capacity for coming up with solutions.

During the past couple of years, IBM has outlined much of its document interchange scheme, but so far the company has not committed itself to a page description language that can serve as a way to connect its diverse terminals, systems, and printers. To be sure, IBM has not entirely ignored these issues. Some of its products do support page composition software developed by outsiders and other IBM products can capture, move, and reproduce detailed images. But Big Blue's products still don't all work together in harmony. This same problem afflicts users of other vendors' systems.

USERS AHEAD OF VENDORS

Hundreds of users are already well ahead of the vendors, pushing output systems to their limits. Banks, for example, have greatly improved the ease with which their statements can be read, as have credit card companies. Direct mail solicitations, group travel itineraries, stock analysts' reports, and countless other computer-generated documents attest to the capabilities of nonimpact printers. By contrast, documents with the same content produced on impact printers are starting to look old-fashioned.

Yet image quality is only one appeal of nonimpact printer technology. In high-volume applications, laser printers are the

The power and flexibility of the laser printer necessitate clever software.

most economical and fastest means to generate documents. Large utilities, financial institutions, and government offices have all installed high-end print engines in order to meet production goals. While a fast electromechanical line printer may run at 3,600 lpm, nonimpact printers can spew out upwards of 20,000 lpm in small type.

In terms of document output, several nonimpact printers exceed 100 pages per minute, and the fastest popular unit, IBM's 3800, runs at more than 200 pages per minute. Nevertheless, no laser printer can do the things an impact printer does.

Many jobs require the production of multiple copies, the handling of multipart forms, or the imprinting of self-stick labels. Other jobs are best run on wide paper, card stock, or other materials that accept oil-based inks better than toners. Whether or not laser printers can handle midrange tasks, impact printers are often the least expensive source of hardcopy output.

A mechanical printer capable of running, say, 1,000 lpm and surviving a high-duty cycle may cost $15,000; a nonimpact printer with output of 20 pages per minute can cost twice that much. As speed requirements fall to 300 lpm, prices of heavy-duty impact printers are dropping to the $3,500 range. While desktop laser printers can equal this throughput for a comparable price, they're not made to take the beating a line printer is built to handle.

At the micro level, where dot matrix printers still reign supreme, the laser printer is often a luxury. Nonimpact technology is replacing other means of printing with full-formed characters, but the machines are still too expensive, too large, and too sophisticated for small business applications. Accounting packages and spreadsheets don't demand anything more complicated than a dot matrix printer, and getting these popular software applications to drive a nonimpact printer can be a chore.

The power and flexibility of the laser printer necessitates clever software; such ingenuity is rarely included in business programs. When pretty output is part of the job, the contest between printer technologies is a closer one. Dot matrix printers can draw graphs and charts, but the resulting printout falls short of what can be produced by a laser printer.

On the other hand, the most popular laser printer, Hewlett-Packard's LaserJet, even in its enhanced version, can't do full-page, high-resolution graphics—it will run out of memory before the program driving it runs out of points to draw. The lowly dot matrix printer, which has to remember only one band of dots at a time, can actually produce a more detailed though less crisp printout.

A user who must have graphs as well as character output can also buy an inexpensive plotter, a dot matrix printer, and a PC clone for less than the price of a LaserJet. But for the user who is more concerned with textual output, choosing the right printer for the right job is often a matter of character.

A selection of vendors and the types of printers each makes begins on p. 70. ◉

Hesh Wiener is the president of Technology News of America Co. Inc., a New York-based research and publishing company. He is a contributing editor of DATAMATION.

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